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NOTES ON THE *GARRYA OVATA* COMPLEX (GARRYACEAE)

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ABSTRACT

Each of the four subspecies of *Garrya ovata* sensu Dahling 1958 is recognized here at specific rank: *Garrya ovata* Benth., *Garrya lindheimeri* Torrey, *Garrya goldmanii* Woot. & Standl., and **Garrya mexicana** (Dahling) Nesom, **comb. nov.** *Garrya lindheimeri* and *G. goldmanii* occur in the USA and Mexico; the other two are endemic to Mexico. A lectotype is designated for *Garrya lindheimeri*.

KEY WORDS: *Garrya ovata*, Garryaceae, USA, Mexico

Garrya ovata Benth. was treated by Dahling (1958) as comprising four subspecies. All four taxa are treated here at specific rank, as *G. goldmanii*, *G. lindheimeri*, *G. mexicana*, and *G. ovata* in the strict sense. Morphological differences among these four *Garrya* species appear to be primarily in leaf morphology and vestiture. Rationale for their treatment at specific rank emphasizes aspects of geography, particularly these: (a) *G. mexicana* is geographically separate from the other three varieties; (b) *G. lindheimeri* and *G. goldmanii* have non-overlapping ranges, habitats, and morphologies in Texas; intergradation occurs where they are sympatric in Coahuila, but even where they co-occur they remain distinct for the most part; (c) typical *G. ovata* is sympatric with *G. lindheimeri* within southern Nuevo León, but they apparently do not intergrade.

The phylogenetic analysis of ITS data by Burge (2011) found that *Garrya lindheimeri* and *G. mexicana* show a sister relationship, but *G. ovata* and *G. goldmanii* were not included in the study. The *G. ovata* complex is part of *Garrya* subg. *Fadyenia* — of the other two *Garrya* species in northeastern Mexico and sympatric with the *G. ovata* complex, *G. glaberrima* Wang. is in subg. *Fadyenia*, *G. laurifolia* subsp. *macrophylla* (Benth.) Dahling in subg. *Garrya*. Neither species is known to hybridize with taxa of the *G. ovata* complex.

KEY TO THE SPECIES

1. Leaf blades 16–40(–55) x 7–25 mm, densely and persistently tomentulose on both surfaces; petioles 3–8 mm long; leaf margins distinctly undulate, with a more or less muriculate-roughened callose rim especially above the middle ..... 1. **Garrya goldmanii**

1. Leaf blades 30–85(–95) x 15–55 mm, glabrous or glabrate to glabrescent adaxially, persistently hairy abaxially; petioles (5–)7–16(–20) mm long; leaf margins flat to slightly undulate, smooth (without a muriculate-roughened callose rim).

2. Vestiture of abaxial leaf surfaces usually densely (less commonly sparsely) sericeous to strigose or strigillose with wavy-straight hairs oriented in a single direction; adaxial surfaces highly glossy, with strongly reticulate-raised venation ..... 4. **Garrya ovata**

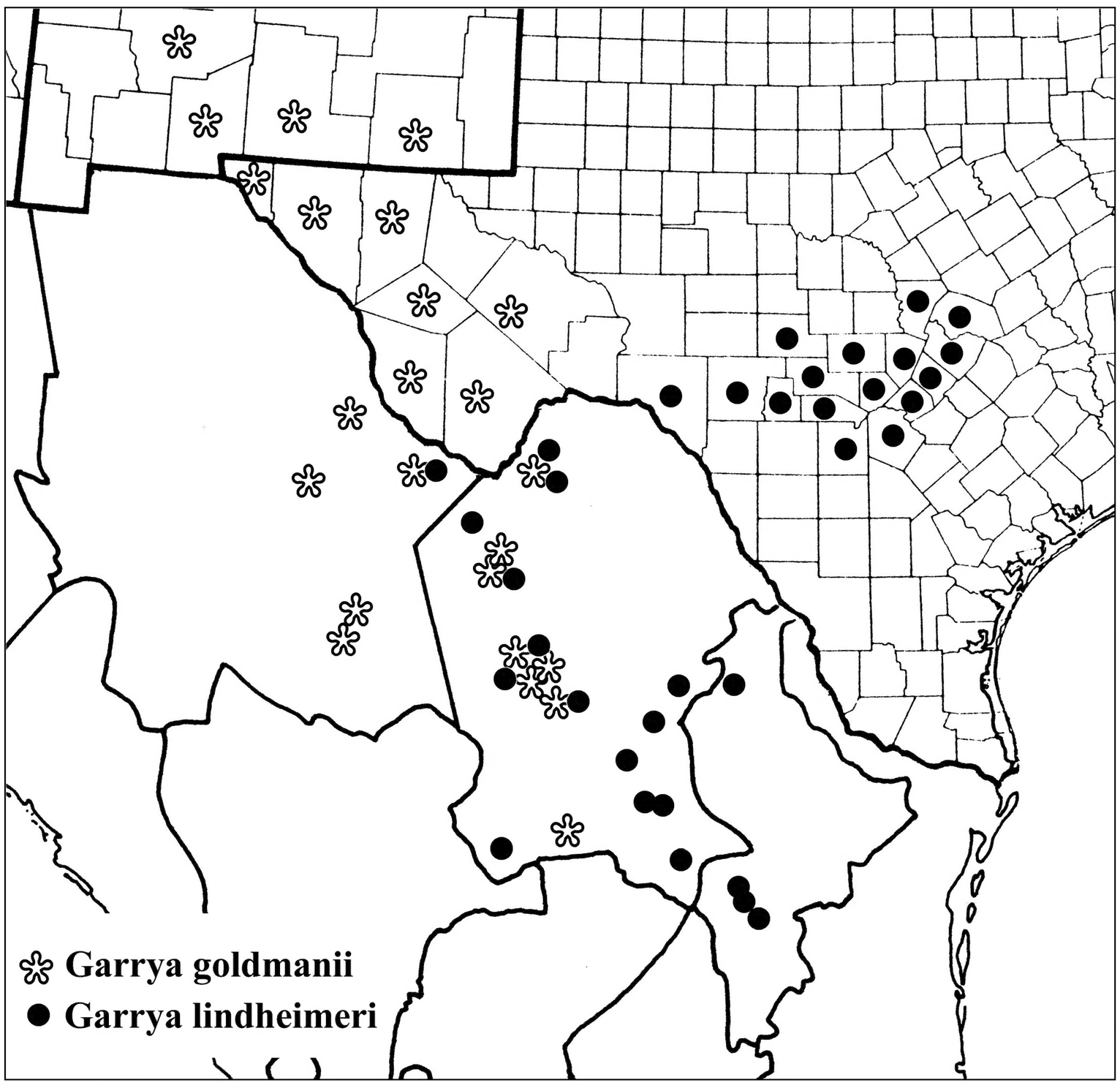
2. Vestiture of abaxial leaf surfaces either densely and persistently puberulent with coiling to recurved hairs -or- sparsely villous with short wavy-straight to curving hairs to glabrescent or glabrous, hairs irregularly oriented; adaxial surfaces glossy to dull, with slightly reticulate-raised venation.

3. Abaxial leaf surfaces densely and persistently puberulent with tightly coiling to strongly recurved hairs ..... 2. **Garrya lindheimeri**
3. Abaxial leaf surfaces sparsely villous with short wavy-straight to curving hairs to glabrescent or glabrous ..... 3. **Garrya mexicana**

1. Garrya goldmanii Woot. & Standl., Contr. U.S. Natl. Herb. 16: 157. 1913. *Garrya ovata* subsp. *goldmanii* (Woot. & Standl.) Dahling, Contr. Gray Herb. 209: 83. 1978. *Garrya ovata* var. *goldmanii* (Woot. & Standl.) B.L. Turner, Atlas Vasc. Pl. Texas, 7. 2003. **TYPE**: **USA**. **New Mexico**. Eddy Co.: limestone ledges near Queen, ca. 1770 m, 31 Jul 1909, *E.O. Wooton s.n.* (holotype: US digital image!; isotype: US digital image!).

In the protologue, Wooton and Standley made this observation: "This is undoubtedly closely related to [*Garrya ovata*] of central Mexico, but it differs in its lower growth, and small, narrow, more pubescent, crispate leaves. The leaves are much less conspicuously veined than in *G. ovata* and the fruit is much smaller."

A collection from Veracruz, Mexico, in the arid, karstic hills of Cofre de Perote, has been identified as *Garrya ovata* subsp. *goldmanii* (G. Castillo-Campos et al. 1998), but this locality is far disjunct from the range of *G. goldmanii*, seemingly part of that of *G. ovata* as mapped here (see Map 3); the identity needs to be studied in a larger context.



Map 1. Distribution of *Garrya goldmanii* and *G. lindheimeri*, based primarily on collections at TEX-LL. Records for Dona Ana, Otero, and Sierra counties, New Mexico, are from NMC and UNM, via SEINET.

2. Garrya lindheimeri Torrey in War Department [U.S.], Pacif. Railr. Rep. 4(5): 136. 1857. *Garrya ovata* var. *lindheimeri* (Torrey) J.M. Coulter & W.H. Evans, Bot. Gaz. 15: 94. 1890. *Garrya ovata* subsp. *lindheimeri* (Torrey) Dahling, Contr. Gray Herb. 209: 81. 1978. **LECTOTYPE** (designated here): **USA. Texas**. In expedition from western Texas to El Paso, New Mexico, May 1849-Oct 1849, *C. Wright 633* (NY digital image!; isolectotypes: GH 4 specimens).

The label of the NY sheet is annotated, apparently in Torrey's hand, as *Garrya lindheimeri* Torr. The protologue also noted that he had seen a Lindheimer collection; 2 sheets of this are at GH (*Lindheimer 122*, May 1846) and presumably one also exists at NY.

In Texas, *Garrya lindheimeri* occurs on the Edwards Plateau and adjacent Lampasas Cut Plain and within the state is completely separated from the range of *G. goldmanii* (Map 1). Dahling identified and mapped it as subsp. *lindheimeri*, geographically distinct in Texas but then sympatric with subsp. *goldmanii* southward through Coahuila. Correll and Johnston (1970) treated *G. lindheimeri* at specific rank, describing it as endemic to the Edwards Plateau and contrasting it in Texas with subsp. *goldmanii*. Diggs et al. (1999) treated it as *G. ovata* subsp. *lindheimeri*, without comment except for noting that it is a Texas endemic restricted to the Edwards Plateau and Lampasas Cut Plain.

In the assessment here, *Garrya lindheimeri* and *G. goldmanii* are sympatric in parts of Coahuila, particularly in the Sierra de la Madera, Sierra de San Marcos, and Sierra del Pino. For the most part the two species retain their morphological integrity and many collections of both species in typical form have been made in these mountains, but intermediates suggest that hybridization and perhaps introgression have occurred. *Garrya goldmanii* occurs in more xeric habitats, as indicated by the differences in distribution and ecology in Texas, and the ecological distinction also apparently exists in Coahuila. Their distinction where sympatric implies a degree of reproductive isolation and provides rationale for maintaining them both at specific rank.

The range of *Garrya lindheimeri* continues from Coahuila into south-central Nuevo León. The identity of a collection from northern Nuevo León cited and mapped by Dahling as subsp. *lindheimeri* is confirmed here as *G. lindheimeri*: Lampazos [de Naranjo], Salvador Resendez, 26 Jun 1937, *Edwards 360* (TEX!). This collection apparently was made at the north end of the Sierra Mamulique. Collections from the Sierra Gomas region slightly to the south of Lampazos all are *G. mexicana* (Map 1).

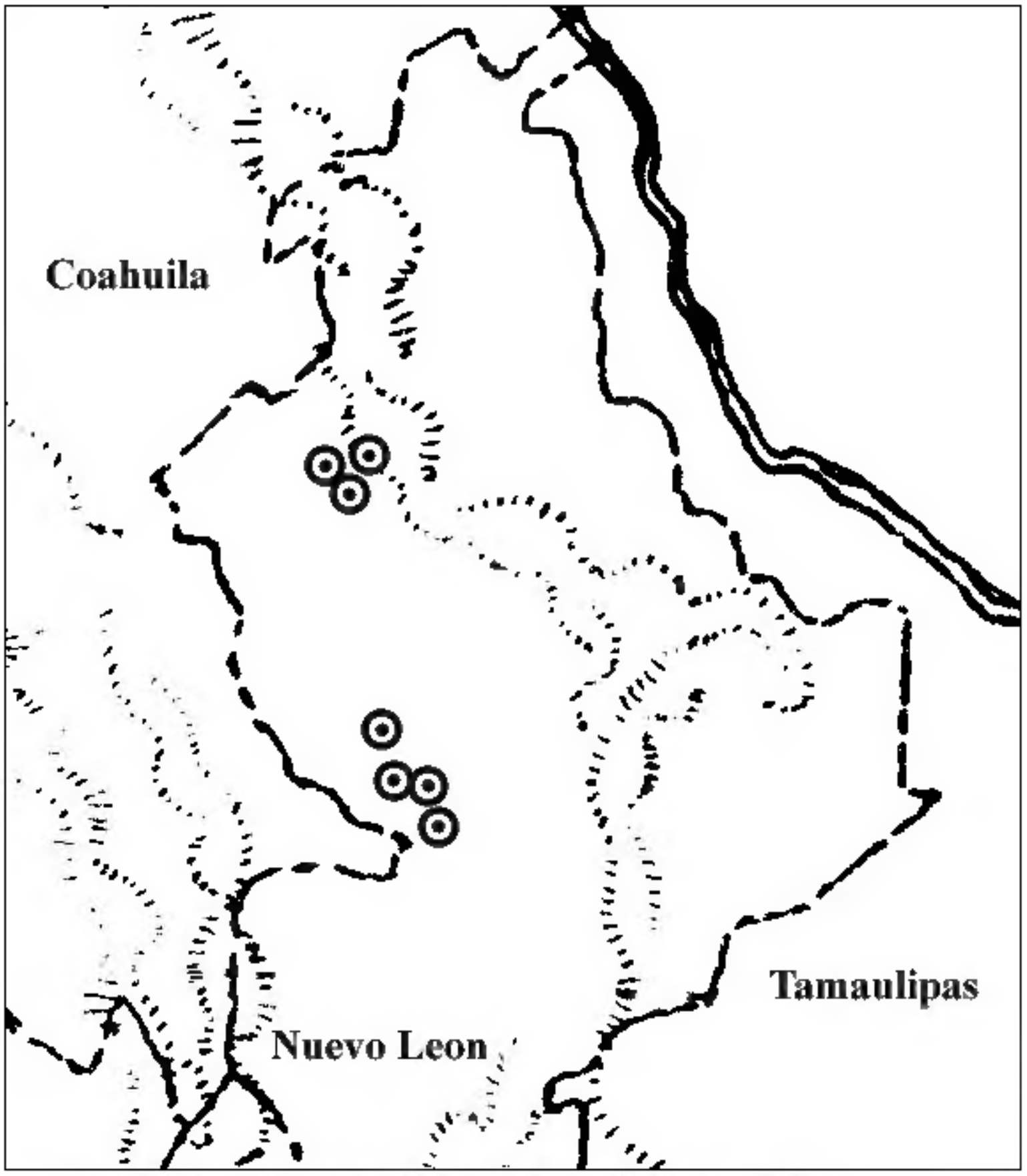
A collection from Sierra Rica in east-central Chihuahua, close to the Texas border, is mapped here as *Garrya lindheimeri* but the vestiture is atypical — abaxial leaf hairs are not tightly coiling but instead loosely wavy and longer. The leaves are relatively large and smooth-margined, thus it is not a variant of *G. goldmanii*, which occurs in typical form in the Sierra Rica. **Chihuahua**. Canyon in N face of Sierra Rica, S of Rancho La Consolación, *Quercus*, *Ptelea*, *Garrya*, *Juglans*, *Sageretia*, 3 May 1973, *Johnston et al. 10771* (TEX).

3. Garrya mexicana (Dahling) Nesom, **comb. nov.** *Garrya ovata* subsp. *mexicana* Dahling, Contr. Gray Herb. 209: 84. 1978. **TYPE: MEXICO. Nuevo León**. Small trees on rocky mountain slope above Horse Tail Waterfalls, well above the road which is above Horse Tail Falls, El Cercado, 11 Feb 1972, *G.V. Dahling 1180* (holotype: GH; isotype: TEX! digital image!).

Garrya mexicana is endemic to montane areas of north-central Nuevo León, where it is morphologically distinct and geographically disjunct from the other three taxa of the *G. ovata* complex. Its sparse abaxial leaf vestiture of relatively straight hairs contrasts sharply with that of *G. lindheimeri*, and leaves of *G. mexicana* are the largest of the species group (largest leaves on a plant are 5–8.5 cm x 2.5–5 cm).

Specimens examined from TEX-LL. **MEXICO. Nuevo León**. Near tops of the mtns surrounding Monterrey, about a 1/2 days climb, steep slopes, Feb 1972, *Dahling 118* (TEX); Mpio. de Villa Santiago, Cañon Guajuco, Rancho Vista Hermosa, 24 Jun 1935, *Mueller 2031* (TEX); Mpio. Bustamante, Sierra Gomas, Bustamante Canyon, N exposure, in a large arroyo on limestone derived soils, *Quercus-Vauquelinia-Ptelea*-palm association, 1100 m, 13 Aug 1988, *Patterson 6626* (TEX); Mpio. Villaldama, Sierra Gomas, in Canyon El Alamo, N-exposed riparian community of *Quercus-Ostrya-Acer* on limestone-derived soil, 1100 m, 15 Aug 1988, *Patterson 6720* (TEX); Sierra Madre, near Monterey, 17 Aug 1903, *Pringle 11816* (LL, TEX); Monterrey, at point farthest east on Chipinque road in thorn-oak ecotonal area, Feb 1961, *Smith 450* (TEX); Mpio. Bustamante, Sierra Lampazos, Rancho Minas Viejas, bosque de *Quercus gravesii*, *Tilia*, *Acer*, *Carpinus*, and *Myriospermum*, 1300-1400 m, 2 May 2001, *Villarreal 9109* (TEX).

Dahling cited duplicates for some of these TEX-LL collections as well as other collections from the vicinity of Monterrey.

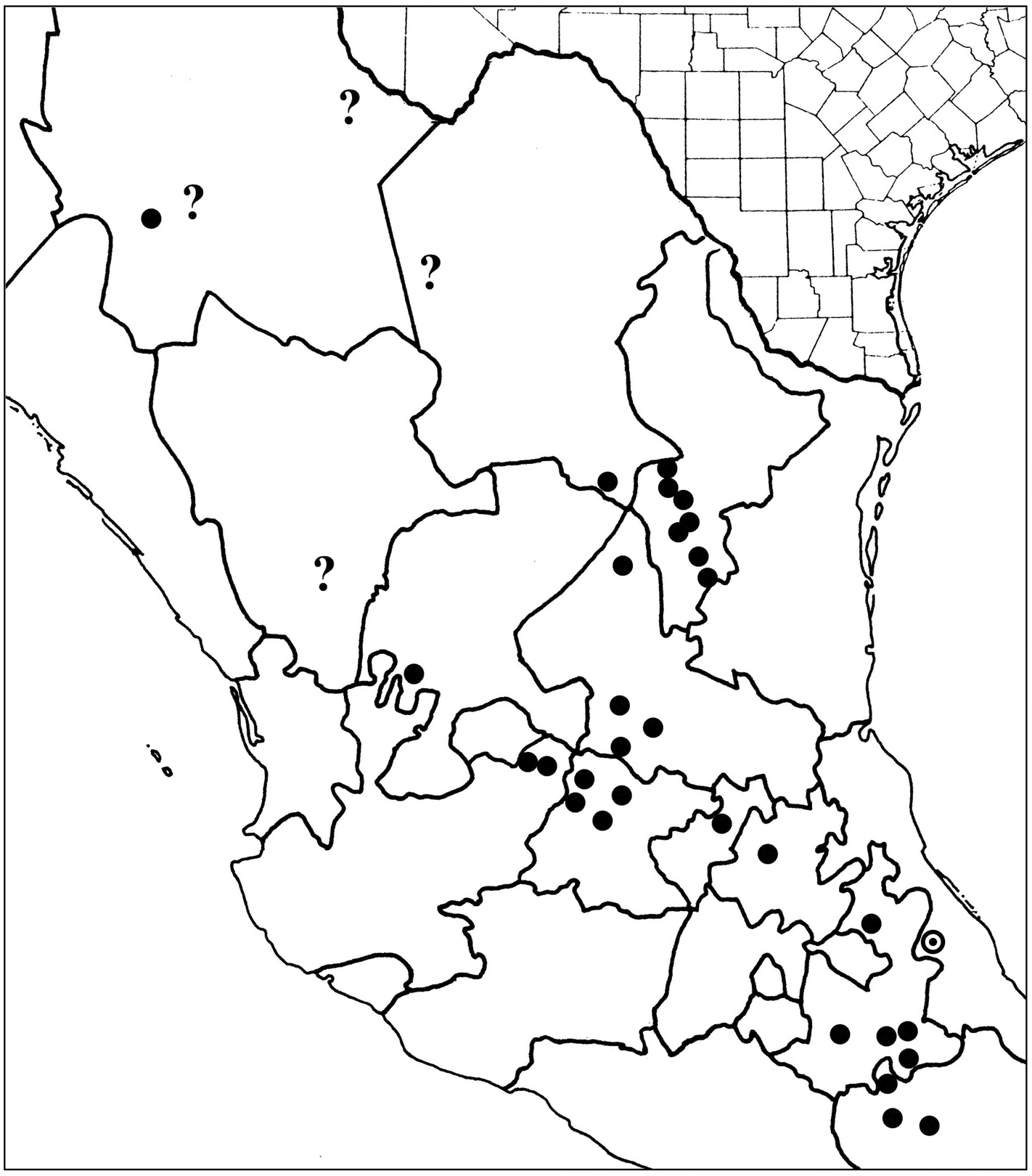


Map 2. Distribution of *Garrya mexicana*, based on collections at TEX-LL

4. Garrya ovata Benth., Pl. Hartw., 14. 1839. *Fadyenia ovata* (Benth.) Endl., Gen. Pl., Suppl. 4: 38. 1847[1848]. **TYPE**: **MEXICO**. [**Guanajuato**]. Gigante and on the Bufa Guanajuato [near the city of Guanajuato], 1839, *K.T. Hartweg 80* (holotype: K; isotypes: BM digital image!, E digital image!, GH, LD digital image!, NY digital image!).

The BM sheet has these collection data: "In rapestibus sterilibus in Monte Gigante alt 9000 ped et in Monte Bufa prope Guanajuato." The protologue has no information about the locality.

Typical *Garrya ovata* is the most widespread and southern taxon of the group. It is known from Chihuahua, southern Coahuila, Guanajuato, Hidalgo, Jalisco, Puebla, Querétaro, San Luis Potosí, and Zacatecas (Dahling 1958; Carranza González 1996; specimens at TEX-LL; from Hidalgo, a collection from XAL fide REMIB). Two collections cited by Dahling from Chihuahua (not seen in present study) need to be reexamined. Durango is cited as part of the range of the species by Carranza González (1996), but I have not seen a voucher or voucher citation. A collection from Sierra Mojada in western Coahuila is cited by Dahling; a collection from Sierra Rica in northeastern Chihuahua might be interpreted as *G. ovata* (see citation above, under *G. lindheimeri*).



Map 3. Distribution of *Garrya ovata*, based primarily on collections seen at TEX-LL. Records from Guanajuato and Queretaro are added from Carranza (1996); the one from Hidalgo and two from Puebla are added from XAL (fide REMIB). The dotted circle in Veracruz is the locality of the collection identified as *G. ovata* subsp. *goldmanii* by Castillo-Campos et al. (1998). Presence in "?" regions is not unequivocally established (see text for comments).

Dahling cited two collections from central Nuevo León as typical *Garrya ovata*, but he did not map them or any others from that state as typical *G. ovata*. Nuevo León plants identified and mapped here as *G. ovata* may prove to represent two (or more) separate entities and to be distinct from the typical expression. Fruits in Nuevo León are glabrous, while in the southern segment (typical *G. ovata*) fruits consistently are hairy.

Plants from high elevation localities (ca. 2800 to 3700 meters) in Coahuila and Nuevo León (Sierra La Marta, Sierra La Viga, Sierra Coahuilon, Sierra Arteaga; Cerro Potosí, Cerro Peña Nevada) tend to have abaxial leaf surfaces densely sericeous with relatively long, wavy hairs and adaxial surfaces with strongly reticulate-raised venation. On gypsum outcrops at lower elevations, abaxial vestiture tends to be strigillose with shorter, straight hairs and adaxial surfaces have less strongly raised venation. Field study of population variation and habitat differentiation would be useful toward reaching a better understanding of the variation patterns.

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